ORGANIC LIGHT EMITTING DIODE DISPLAY DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

Korean Patent Application No. 10-2013-0063505, filed on Jun. 3, 2013, and entitled, "Organic Light Emitting Diode Display," is incorporated by reference herein in its entirety.

BACKGROUND

1. Field

One or more embodiments described herein relate to a display device.

2. Description of the Related Art

Melatonin is a hormone that influences biorhythms (such as circadian rhythm and annual rhythm in reproductive activity) by sensing photoperiods. The secretion of melatonin is controlled by melatonin control cells found in human eyes.

When melatonin control cells absorb light of a melatonin production inhibition wavelength of 446 nm to 477 nm having a peak of 464 nm in sunlight, the melatonin control cell suppresses secretion of melatonin. Thus, in daytime, during which light of the melatonin production inhibition wavelength is irradiated, the production of melatonin is suppressed by the melatonin control cells. As a result, the human body feels less tired. Conversely, in nighttime, during which light of the melatonin production inhibition wavelength is not irradiated, the production of melatonin is not suppressed. As a result, the human body feels tired and needs sleep.

Melatonin affects other biological functions. For example, melatonin influences metabolism related to blood flow, hormone control, and removal of bodily waste.

These days, people tend to stay indoors more during the day, and thus have less chance of being exposed to sunlight including a melatonin production inhibition wavelength. The human body, therefore, may not be able to function under optimum conditions. Also, the production of melatonin may be suppressed late into the night because of watching television or other lighting effects. Consequently, people may not have sound sleep. In an attempt to obtain improved sleep, people may take chemically composed melatonin medications or supplements. However, these medications or supplements have been shown to have deleterious effects.

SUMMARY

In accordance with one or more embodiments, an organic light emitting diode (OLED) display device includes a substrate and three color pixels and a melatonin control pixel on the substrate, wherein the melatonin control pixel emits or blocks light in a melatonin production inhibition wavelength range. The melatonin production inhibition wavelength range may include about 414 nm to about 514 nm. The light emitted from the melatonin control pixel may have a peak in the melatonin production inhibition wavelength range, and may have a full width at half maximum of greater than 1 nm and less than 50 nm.

Each of the three color pixels and the melatonin control pixel may include thin film transistors on the substrate, a first electrode connected to the thin film transistors, an organic emission layer on the first electrode, and a second electrode on the organic emission layer. A thickness of the organic emission layer of one or more of the three color pixels may be different from a thickness of the organic emission layer of the melatonin control pixel. The organic emission layer of the melatonin control pixel may emit the light in the melatonin production inhibition wavelength range. The three color pixels may be a red pixel, a green pixel, and a blue pixel.

In accordance with another embodiment, a display device includes a signal line and a first pixel connected to the signal line, wherein the first pixel is to emit light in a predetermined range during a first time period and is not to emit light in the predetermined range during a second time period during which an image is displayed, wherein the second time period does not overlap the first time period, and wherein the predetermined range is a melatonin production inhibition wavelength range.

The first pixel may receive a control signal from the signal line. The second pixel may emit or may not emit light in the predetermined range based on the control signal. The first time period may be daytime and the second time period may be nighttime.

A plurality of second pixels may emit different colors of light during the first and second time periods. The light emitted from the first pixel may have a peak in the melatonin production inhibition wavelength range, and has a full width at half maximum of greater than 1 nm and less than 50 nm. A sum of light from the first pixel and light from at least one of the second pixels may combine to increase inhibition of production of melatonin in during the first time period. At least one of the second pixels may be a blue pixel.

In accordance with another embodiment, a display device includes a first pixel to emit light; and a second pixel to emit light in a predetermined range in a first time period and to not emit light in the predetermined range in a second time period during which the first pixel emits light, wherein the first pixel includes a first organic emission layer having a first thickness and the second pixel includes a second organic emission layer having a second thickness different from the first thickness, and wherein a resonance pattern is formed in the second pixel to emit light in a melatonin production inhibition wavelength range that corresponds to the predetermined range.

The first time period may be daytime and the second time period may be nighttime. The first pixel may emit blue light. Also, the first pixel may emit light when the second pixel does not emit light in the predetermined range. The light emitted from the first pixel may have a peak in the melatonin production inhibition wavelength range, and may have a full width at half maximum of greater than 1 nm and less than 50 nm. A sum of light from the first pixel and light from the second pixel may combine to increase inhibition of production of melatonin in during the first time period.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates an embodiment of a display device;

FIG. **2** illustrates an embodiment of a pixel of the display device;

FIG. **3** illustrates a layout for sequentially arranged pixels of the display device;

FIG. **4** illustrates a layout of a melatonin control pixel in FIG. **3**;

FIG. **5** illustrates a view taken along section line V-V in FIG. **4**;

FIG. **6** illustrates a view taken along section line VI-VI in FIG. **3**; and